Claims:

1. An all-optical, optical cross-connect, comprising:

first and second pluralities of multiport optical devices, said first plurality of multiport optical devices having at least one input port for receiving a WDM optical signal and a plurality of output ports for selectively receiving one of more wavelength components of the optical signal, said second plurality of multiport optical devices having a plurality of input ports for selectively receiving one of more wavelength components of the optical signal and at least one output port for selectively receiving one of more wavelength components of the optical signal, at least one of said first or second plurality of multiport optical devices being all-optical switches that can route every wavelength component independently of every other wavelength component; and

wherein the plurality of input ports of the second plurality of multiport optical devices are optically coupled to respective ones of the plurality of output ports of the first plurality of multiport optical devices.

2. The optical cross-connect of claim 1 wherein the other of the first or second plurality of multiport optical devices are all-optical switches that can route every wavelength component independently of every other wavelength component.

3. The optical cross-connect of claim 1 wherein the other of the first or second plurality of multiport optical devices are couplers.

4. The optical cross-connect of claim 1 wherein said all-optical switch comprising:

a plurality of wavelength selective elements that each select a channel wavelength from among the plurality of wavelength components received at the at least one input port; and

a plurality of optical elements respectively associated with said plurality of wavelength selective elements, each of said optical elements directing one of the selected wavelength components selected by the associated wavelength selective

element to any one of the output ports independently of all other channel wavelengths.

5. The optical cross-connect of claim 2 wherein each of said all-optical switches comprising:

a plurality of wavelength selective elements that each select a channel wavelength from among the plurality of wavelength components received at the at least one input port; and

a plurality of optical elements respectively associated with said plurality of wavelength selective elements, each of said optical elements directing one of the selected wavelength component selected by the associated wavelength selective element to any one of the output ports independently of all other wavelength components.

6. The optical cross-connect of claim 4 wherein said optical elements each include a tiltable mirror.

7. The optical cross-connect of claim 4 further comprising a free space region disposed between the input ports and the wavelength selective elements.

8 The optical cross-connect of claim 4 wherein said optical elements retroreflect said channel wavelengths.

9. The optical cross-connect of claim 4 wherein said wavelength selective elements are thin film filters each transmitting therethrough a different one of the wavelength components and reflecting the remaining channel wavelengths.

10. The optical cross-connect of claim 4 wherein said optical elements are reflective mirrors that are selectively tiltable in a plurality of positions such that in each of the positions the mirrors reflect the wavelength component incident thereon to any selected one of the output ports.

11. The optical cross-connect of claim 10 wherein said reflective mirrors are part of a micro-electromechanical (MEM) reflective mirror assembly.

12. The optical cross-connect of claim 11 wherein said reflective mirror assembly is a retroreflective mirror assembly.

13. The optical cross-connect of claim 10 wherein said reflective mirrors are part of a retroreflective optical assembly.

14. The optical cross-connect of claim 10 wherein said reflective mirrors each include a piezoelectric actuator.

15. The optical cross-connect of claim 7 wherein said free space region comprises an optically transparent substrate having first and second parallel surfaces, said wavelength selective element includes a plurality of wavelength selective elements arranged in first and second arrays extending along the first and second parallel surfaces, respectively.

16. The optical cross-connect of claim 15 wherein the optically transparent substrate includes air as a medium in which the optical signal propagates.

17. The optical cross-connect of claim 15 where the optically transparent substrate is silica glass.

18. The optical cross-connect of claim 15 wherein said first and second arrays are laterally offset with respect to one another.

19. The optical cross-connect of claim 18 wherein each of said wavelength selective elements arranged in the first array direct the selected wavelength component to another of said wavelength selective elements arranged in the second array.

20. The optical cross-connect of claim 4 further comprising a collimating lens disposed between each one of said wavelength selective elements and the optical element associated therewith, each of said optical elements being positioned at a focal point of the lens associated therewith.

21. An all-optical, optical cross-connect, comprising:

a first set of m reconfigurable all-optical switches, where m is ∞ 3, each of said reconfigurable switches having at least (m+1) prearranged ports for receiving one or more wavelength components of a WDM optical signal, said reconfigurable switches selectively directing any wavelength component from one of the prearranged ports to any of the remaining ones of the prearranged ports independently of every other wavelength component;

a second set of m reconfigurable all-optical switches each having at least (m+1) particular ports for receiving one or more wavelength components of a WDM optical signal, said reconfigurable switches routing any wavelength component from one of the particular ports to any of the remaining ones of the particular ports independently of every other wavelength component; and

wherein each of the prearranged ports of each reconfigurable switch in the first set of switches is optically coupled to a particular port of a different reconfigurable switch in the second set of switches.

22. The optical cross-connect of claim 21 wherein each of said m reconfigurable switches in the first set of switches have at least (m+2) prearranged ports and said m reconfigurable switches in the second set of switches have at least (m+2) particular ports.

23. The optical cross-connect of claim 21 wherein each of said all-optical switches comprising:

a plurality of wavelength selective elements that each select a wavelength component from among the wavelength components of the WDM optical signal received at one of the input port; and

a plurality of optical elements respectively associated with said plurality of wavelength selective elements, each of said optical elements directing one of the selected wavelength components selected by the associated wavelength selective element to any one of the ports independently of all other channel wavelengths.

24. The optical cross-connect of claim 23 wherein said optical elements each include a tiltable mirror.

25. The optical cross-connect of claim 23 further comprising a free space region disposed between the ports and the wavelength selective elements.

26. The optical cross-connect of claim 23 wherein said optical elements retroreflect said channel wavelengths.

27. The optical cross-connect of claim 4 wherein said wavelength selective elements are thin film filters each transmitting therethrough a different one of the wavelength components and reflecting the remaining wavelength components.

28. The optical cross-connect of claim 23 wherein said optical elements are reflective mirrors that are selectively tiltable in a plurality of positions such that in each of the positions the mirrors reflect the wavelength component incident thereon to any selected one of the output ports.

29. The optical switch of claim 28 wherein said reflective mirrors are part of a micro-electromechanical (MEM) reflective mirror assembly.

30. The optical cross-connect of claim 29 wherein said reflective mirror assembly is a retroreflective mirror assembly.

31. The optical switch of claim 28 wherein said reflective mirrors are part of a retroreflective optical assembly.

32. The optical switch of claim 28 wherein said reflective mirrors each include a piezoelectric actuator.

33. The optical switch of claim 25 wherein said free space region comprises an optically transparent substrate having first and second parallel surfaces, said wavelength selective element includes a plurality of wavelength selective elements arranged in first and second arrays extending along the first and second parallel surfaces, respectively.

34. The optical switch of claim 33 wherein the optically transparent substrate includes air as a medium in which the optical signal propagates.

35. The optical switch of claim 33 where the optically transparent substrate is silica glass.

36. The optical switch of claim 33 wherein said first and second arrays are laterally offset with respect to one another.

37. The optical switch of claim 36 wherein each of said wavelength selective elements arranged in the first array direct the selected wavelength component to another of said wavelength selective elements arranged in the second array.

38. The optical switch of claim 23 further comprising a collimating lens disposed between each one of said wavelength selective elements and the optical element associated therewith, each of said optical elements being positioned at a focal point of the lens associated therewith.